

REMARKS

Claims 1 to 32 are all the claims pending in the application, prior to the present Amendment.

The Examiner has made of record the telephone election of species requirement and applicants' election of Species B. The Examiner requires that applicants affirm this election when responding to the present Office Action. Applicants hereby affirm this election.

Claims 10-26 and 28-32 have been objected to under 37 CFR § 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim.

In response, applicants have canceled claims 17-22 and 24-32, and have amended claims 10 to 14 and 23 to depend from claim 3 only. Claim 16 is a withdrawn claim and has not been amended.

In view of these amendments, applicants request withdrawal of this objection.

Claims 2-9 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

The Examiner takes the position that it is unclear whether the limitation in lines 3-6 of claim 2 and lines 3-6 of claim 3, i.e., "assuming that an optical bandgap (hereinafter referred to as "BG") of raw material metal oxide is BGO and the BG of metal oxide after the dry mixing is BG1," positively limits BGO to be the optical bandgap of the raw material oxide and BG1 to be the optical bandgap of the product oxide. That is, the term "assuming" does not clearly require the bandgap values to be as claimed.

Similarly for claims 5-9, the Examiner believes that it is not clear that the recitation "assuming . . . time is t (minute)" in lines 3-7 of claim 5 positively limits the variables to provide the relation claimed.

In response, applicants have amended claims 2 and 3 to delete the term "assuming." Applicants have incorporated the recitations of claim 5 into claim 3, and in so doing, have not employed the term "assuming.

In view of the above, applicants request withdrawal of this rejection.

Claims 2-4, 8, and 9 have been rejected under 35 U.S.C. 102(b) as being anticipated by Begin-Colin et al [J. Solid State Chem. 149, 41-48, (2000)], with supporting evidence provided by Fujimori (US 6,623,129).

In addition, claims 5-7 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Begin-Colin et al [J. Solid State Chem. 149, 41-48, (2000)].

Applicants have amended claims 2 and 3 to incorporate the recitations of claim 8, and to state that the blending ratio of Particle Group A and Particle Group B is from 5/95 to 30/70, as disclosed at page 12, lines 20 to 22 of the present specification. In addition, applicants have amended claim 3 to incorporate the recitations of claim 5.

Thus, claims 2 and 3 each recite that the raw material metal oxide comprises a metal oxide powder having an average primary particle size of 100 to 500 nm (hereinafter referred to as Particle Group A) and a metal oxide powder having an average primary particle size of 10 to 40 nm (hereinafter referred to as Particle Group B), the particle sizes being as converted from the specific surface area determined by the BET method. As recited in claims 2 and 3, the blending

ratio of Particle Group A and Particle Group B is from 5/95 to 30/70. Thus, claims 2 and 3 recite that particles having a particle size of 10 to 40nm (Particle Group B) are in an amount of 70 to 95%, and the particles having a particle size of 100 to 500 nm (Particle Group A) are in an amount of 5 to 30%.

Applicants submit that Begin-Colin et al, as evidenced by Fujimori, do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of these rejections.

The Examiner has referred to Fig. 4 of Begin-Colin et al, and has taken the view that the powder in Fig. 4 of Begin-Colin et al includes particles having diameters smaller than 20nm and includes particles between 100 and 500nm in diameter.

However, it can be seen from Fig. 4 of Begin-Colin et al that particles between 100 and 500nm in diameter are not present in a substantial amount.

Moreover, it is not clear from Fig. 4 of Begin-Colin et al whether particles having diameters smaller than 20nm actually exist in Begin-Colin et al, and even if present, the amount is far less than the 70% set forth in the present claims.

Further, the amount of the particles shown in Fig. 4 of Begin-Colin et al is by volume. Therefore, if the amount by volume of particles having diameters smaller than 20nm, even if there are any in Fig. 4, is reduced to the amount by weight of the particles having diameters smaller than 20nm, the amount by weight of the particles is so small that it can be neglected, and is far less than 5%.

In contrast, the amount of the Group B particles or Group C and D particles in the present invention is a substantial amount. For example, in Example 1 of the present application, Particle

Group A and Particle Group B are 1.5g and 13.5g, respectively. In Example 2 of the present application, Particle Group A, Particle Group C and Particle Group D are 1.5g, 6.8g and 6.7g, respectively. The difference between the present invention and Fig. 4 of Begin-Colin et al is significant.

Therefore, applicants submit Begin-Colin et al do not teach or suggest the present invention.

The Examiner has taken that view that the mixing conditions of Begin-Colin et al fall within the conditions of the present invention. However, Begin-Colin et al never teach the combination of Particle Group A and Particle Group B. Therefore, the particles of the present invention cannot be produced by Begin-Colin et al.

Begin-Colin et al do not disclose the method of amended claim 3.

Further, Begin-Colin et al do not disclose or suggest that when mixing is performed under conditions that satisfy the formula kl of claim 3, the bandgap as claimed in claims 2 and 3 is obtained.

In the present invention, ΔBG is from 0.01eV to 0.45eV.

Fujimori discloses that anatase titanium oxide has a BG of 3.2eV and rutile titanium oxide has a BG of 3.0eV. The ΔBG between anatase titanium oxide and rutile titanium oxide, therefore, is 0.3eV.

In the present invention, as recited in claims 2 and 3, the raw material comprises a metal oxide powder having an average primary particle size of 100 to 500nm ("Particle Group A") and a metal oxide powder having an average particle size of 10 to 40 nm ("Particle Group B").

When the mixing is performed for such mixture, ΔBG can be from 0.01eV to 0.45eV to attain a BG of less than 3.0eV, as shown in Examples 1, 2, 4 and 6 of the present specification.

In Fujimori, it is not possible to attain a BG of less than 3.0eV.

Therefore, the present invention as claimed in the amended claims is not suggested by Begin-Colin et al, even in view of Fujimori.

Further, Begin-Colin et al teach a process in which anatase titanium oxide changes to rutile titanium oxide by a mechanical means, and disclosed that the change was observed by x-ray crystal diffraction.

Begin-Colin et al, however, do not teach a titanium oxide particle microstructure which has a bandgap suitable for a dye-sensitive solar cell and its production method, as in the present invention.

Fujimori disclose the bandgaps of anatase and rutile titanium oxides. However, since Fujimori disclose that the optical activity of the anatase is superior to that of the rutile, the Fujimori I disclosure does not relate to a solar cell. If Fujimori related to a solar cell, a rutile titanium oxide would not be changed to anatase titanium oxide.

Therefore, a person skilled in the art would not conceive the present inventions, from Begin-Colin et al and Fujimori.

In view of the above, applicants request withdrawal of these rejections.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: July 24, 2009


Sheldon I. Landsman
Registration No. 25,430